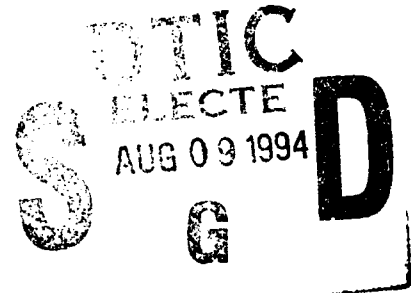


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Monterey, California

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THESIS

**OPTIONS AVAILABLE FOR PROVIDING
FAMILY HOUSING TO NAVY FAMILIES
IN THE CONTINENTAL UNITED STATES**

by

Dennis G. Smythe

June, 1994

Thesis Co-Advisors:

**Richard D. Milligan
Gregory G. Hildebrandt**

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This thesis investigates three of the options available to provide adequate and affordable family housing to Navy families in the continental United States. Current Department of Defense policy is compared to both the public/private option and the downsizing of housing assets (with pay and allowance changes) option. Quantitative and qualitative issues are addressed, as are the advantages and disadvantages of each option.

As a result of this analysis, this study recommends that the Department of Defense revise the Variable Housing Allowance (VHA) determination procedures, revise the housing deficit determination procedures, and eliminate the scoring of public/private ventures. Further, this study concludes that the Department of Defense has an economic justification for providing on-base housing. Efforts should be directed toward "right-sizing" housing assets rather than downsizing, with careful scrutiny given to the revitalization backlog.

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Options Available for Providing Family Housing to
Navy Families in the Continental United States

by

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Submitted in partial fulfillment
of the requirements for the degree of

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I. INTRODUCTION

A. BACKGROUND

Roughly twenty-four percent of Navy families presently reside in on-base family housing [Ref 13]. The Department of Defense proposes to increase this to approximately thirty-eight percent in the years ahead [Ref 4:p. 32]. This would be a natural evolution as the Forces are downsized, with housing assets retiring at a slower rate than the force drawdown. As an alternative to the Department of Defense's present plan, the Congressional Budget Office proposes pay and allowance changes to encourage Navy families to reside in the local community, thus saving the government money and providing a higher quality of housing to the families [Ref 4]. With these alternatives in mind, Congress has finished work on a \$10 billion military construction budget for fiscal year 1994 that includes slightly over one billion dollars for Navy family housing in the continental United States. A little more than \$345 million would be for new construction, with an additional \$665 million to be used for operations, maintenance and utilities costs for existing Navy family housing.

The Department of Defense (DOD) has recognized the importance family housing plays on the morale of the Navy member, and believes on-base housing compliments the overall

compensation package they can offer and enhances their efforts to recruit and retain quality personnel in today's all-volunteer force. The Department of Defense expresses the current shortage of family housing as alarming, especially in the more than thirty communities it has designated as "critical housing" areas, eighteen of which are located in the continental United States (CONUS) [Ref 12]. Cities such as San Diego and Washington, D.C. are included in this category. The critical housing areas have long waits for obtaining on-base housing, as well as minimal affordable housing within the established criteria of a one hour commute to the base. The Department of Defense is interested in reducing the hardships on military families assigned to high cost housing areas.

The large budget deficits and reductions in military spending following the end of the Cold War have forced the Department of Defense to pursue all options available to provide affordable housing to the military member. The Department of Defense's current policy is to retain and maintain as many existing housing assets as feasible, while continuing with the proposed new family housing construction program. Naturally, the percentage of personnel living in on-base housing would increase as family housing assets would be retired at a slower rate than the personnel drawdowns. The number of Department of Defense housing assets is projected to decline by four percent by 1999, while the number of military families stationed in the continental United States is

projected to decline by 27 percent. The net effect will be an increase in the percentage of families residing in on-base housing [Ref 4:p. 32].

The Department of Defense also endorses the privatization of family housing in addition to or in lieu of the military construction options. The Department's official policy is to rely on the local community as the first source of adequate and affordable housing, with new construction or public/private ventures used to make up shortfalls. There are three main alternatives available within the privatization option, all of which have been successfully used in the past. Included are the Section 801 Build-to Lease Program, Section 802 Rental Guarantee Program, and the construction of military family housing under Title 10, U.S.C. Section 2667.

Congressional Budget Office studies suggest a plan in which numerous housing assets are retired, fewer new units are built, and personnel receive pay and allowance changes appropriate to provide the incentive to live in the civilian community. The intention is to have the savings generated from reduced maintenance, operations and new construction outlays outweigh the additional expenditures on allowances.

B. THESIS OBJECTIVE

The purpose of this thesis is to investigate three of the options available to provide adequate and affordable family housing to Navy families in the continental United States

(CONUS). Current Department of Defense policy will be compared to both the public/private option and the downsizing of housing assets (with pay and allowance changes) option. Quantitative and qualitative analysis of the issues of each of the options will be conducted with appropriate recommendations made concerning the best alternative. For the purpose of this thesis, on-base housing refers to government owned housing.

C. SCOPE AND LIMITATIONS

This thesis will analyze the issues and costs of each of the three options identified and make recommendations based on the comparisons of the three. It will only consider the alternatives for providing CONUS Navy family housing (excluding Marine Corps housing), analyzing the impact on all Navy personnel, both officer and enlisted.

Excluded from this thesis will be any investigation of the consolidation of all services into a single Department of Defense housing organization, or the creation of a rental market within the Department of Defense housing organization.

D. THESIS OVERVIEW

Succeeding chapters will research the three family housing options in detail and conclude with recommendations. Chapter II will provide an overview of Navy family housing organization, eligibility and allowances. Chapter III will identify current Department of Defense policy, present Navy

family housing assets, and proposed Navy housing needs. The three public/private ventures will be discussed in Chapter IV, and the downsizing of Navy family housing assets with appropriate pay and allowance changes will be discussed in Chapter V. Chapters II, III and IV will also investigate the advantages and disadvantages of each of the three options. Chapter VI will provide an analysis of the research leading to the conclusions and recommendations in Chapter VII.

II. NAVY MILITARY FAMILY HOUSING OVERVIEW

A. ELIGIBILITY FOR NAVY FAMILY HOUSING

Policy regarding the assignment to and utilization of Navy family housing is provided within OPNAVINST 11101.13H. The main objective of Navy managed family housing is to provide adequate housing to military families. Assignment procedures and utilization have been designed to provide the broadest opportunity for occupancy by the largest number of eligible personnel. Official Department of Defense policy is to construct family housing at those bases where affordable and adequate housing is not readily available in the local civilian community.

Navy personnel, with accompanying dependents, who are in pay grades E-5 and above are eligible for Navy family housing. Personnel in pay grades E-4 and below, with accompanying dependents, must have two years of service before they are eligible. Base Commanding Officers are authorized to open up more housing to personnel in the rank of E-4 and below not meeting the two years service criteria to reduce the financial burden to this group. Accompanying dependents are those which are expected to reside with the member for nine months out of the year. Military members without dependents are not eligible for Navy family housing.

B. ORGANIZATION OF NAVY FAMILY HOUSING

Navy family housing is maintained and operated by the Naval Facilities Engineering Command (NAVFAC), headquartered in Alexandria, Virginia. OPNAVINST 11101.13J provides guidance on the organization and management of family housing for all of the Navy.

The typical housing organization is overseen by a housing manager with appropriate staff personnel. This staff does the administrative duties, inspections, referrals, and assists in the management of the inventory. The housing manager is responsible for assignments, referrals, budgeting, maintenance, inspections and future planning. The housing manager will typically oversee a government housing maintenance organization or will contract out these services to a Public Works Center or private contractor. The manager will work for or closely with the Public Works Officer of a Navy Public Works Department, or will work for a Commanding Officer of a Public Works Center.

Normally the base Commanding Officer will be the Area Housing Authority having final decision authority on all housing matters. The housing manager will report via the chain of command to the Area Housing Authority for all matters, both administratively and for budget purposes. The Area Housing Authority will then report to their normal superior for administrative and operational matters, but will submit budget requests for Navy family housing to NAVFAC.

These budget requests will be reviewed and consolidated by NAVFAC and will form the basis for the Family Housing, Navy and Marine Corps Appropriation, a part of the Military Construction Bills in the budget process. All Navy and Marine Corps commands containing housing assets are required to submit budget requests for their housing to NAVFAC.

C. FAMILY HOUSING, NAVY AND MARINE CORPS APPROPRIATION

The Family Housing, Navy and Marine Corps (FH,N&MC) appropriation finances the cost of operating, maintaining and constructing family housing for the Navy and Marine Corps. The annual expenditures within this appropriation are intended to provide sufficient funding to operate, maintain, and improve units already in the inventory; renew leases currently being held on existing public/private ventures; and secure new leases or construct new units to eliminate the housing backlog in military communities. The appropriation has two subheads, the construction subhead with a five year obligation period, and the operations and maintenance subhead with a one year obligation period.

Annually, the Department of the Navy must submit a budget request for funding to support the Navy family housing community as part of the overall Department of the Navy budget request to the Office of the Secretary of Defense. The area housing authority for each Navy family housing community is responsible for providing input to NAVFAC, who will

consolidate all inputs and forward a budget request up the chain of command.

The flow of funds begins once the budget is approved by Congress and signed by the President. The Treasury prepares Appropriation Warrants which are co-signed by the General Accounting Office (GAO). The Office of Management and Budget (OMB) then apportions the funds to the Secretary of Defense (SECDEF). The SECDEF, via the Office of the Navy Comptroller (NAVCOMPT) then allocates the funds to the Chief of Naval Operations (CNO), who in turn allocates the funds to NAVFAC.

NAVFAC is the central manager of the Navy and Marine Corps housing assets, and thus responsible for appropriate budgeting. NAVFAC separates the Navy and Marine Corps housing funds, then passes the construction funds via allocation and the operations and maintenance funds via allotment to the Engineering Field Divisions (EFD). The EFD's then make debt payments for construction via allotment from the construction allocation. They pass funds to the Field Activities for maintenance and operations of family housing on a reimbursable basis.

D. HOUSING ALLOWANCES

Housing allowances for personnel living in the continental United States include a Basic Allowance for Quarters (BAQ) and a Variable Housing Allowance (VHA). These allowances are nontaxable and vary according to the member's pay grade and

whether or not they have dependents. The BAQ rates are set annually, normally linked to the annual military pay raise. The VHA rates are also set annually for each geographical location, but by a much different method. Each year the Department of Defense gathers information on median expenditures by military families for housing in each military housing area, defined to be the geographical area that encompasses all public and private housing within 30 miles within a 60 minute commute, of a military installation. This is done through the use of an annual survey of military personnel living in private-sector housing. No distinction is made between renters and homeowners. The Department of Defense then sets the VHA rates for each paygrade and dependency status so that the median out-of-pocket cost (difference between local median housing expenditures and a member's BAQ plus VHA) is the same in both high-cost and low-cost areas of the country.

The BAQ and VHA received by the Navy member normally cover about 80 percent of what the typical military family spends for housing rent (or mortgage for homeowners) and utilities in the private sector [Ref 4:p. 7]. Families pay the remaining 20 percent out of pocket from other income. The BAQ, the largest allowance, covers roughly 60 percent, while the VHA covers roughly 20 percent.

All Navy personnel receive a BAQ. They may surrender it in exchange for housing on a Department of Defense

installation or they may spend it on housing in the private sector. Most members living in the private sector and receiving BAQ will also receive VHA. Only those stationed in an extremely low cost area will not.

VHA was enacted by Congress in 1980 to compensate families living in the United States for regional differences in the cost of housing. An offset policy came into effect in 1985, which requires full VHA to be paid only if the members housing expenditures are greater than or equal to their total allowances (BAQ plus VHA). Thus, a recipient's payment will be reduced by 50 cents for every dollar by which their total housing allowances exceed actual expenditures. In no event will the amount of the reduction exceed the prescribed VHA for the member [Ref 16].

Internal memorandums within the Office of the Secretary of Defense (OSD) suggest that the Department of Defense uses its policy on housing allowances to pursue four general policy goals [Ref 3:p. 64]. First, the Department of Defense wants the allowances to pay for a significant portion of adequate housing for the military member. Second, the allowances should offset variations in housing rents and alleviate hardships encountered as members transfer from station to station. Third, they should prevent any member from living in inadequate housing. And finally, the allowances should maintain the Department of Defense hierarchy; meaning allowances should rise as pay grade rises.

III. DEPARTMENT OF THE NAVY STATUS QUO PROGRAM

A. CURRENT POLICY

The present policy within the Department of Defense, as stated in DODINST 4165.63M, is to construct or lease family housing only when personnel must be housed on-base to enhance military readiness or when the local community cannot or will not provide the housing required to support the military population.

There are numerous reasons why civilian communities may not provide moderately priced housing, the type frequently required by military personnel. Often environmental concerns, or a lack of suitable excess land for future development, restrict construction efforts. The local community may be unwilling to rezone an area to construct such housing. They may wish to maintain a higher residential real estate value, or the costs of rezoning (fire and police protection, roads, utilities, etc) may exceed the tax revenue base available to the community.

Due to these factors, the quantity of acceptable and affordable housing near many military bases is decreasing. Frequently, personnel stationed in the vicinity of metropolitan cities, or high cost areas, reside in housing which, according to Department of Defense standards is

unacceptable [Ref 8:p. 5]. This is significant since the majority of military families live within commuting distance of large civilian communities [Ref 9:p. 165].

The Department of Defense has an established method for determining the availability of suitable private sector housing. The first step is to determine the number of military families that will be stationed in a given area in the future, usually the next five or six years. Next, the Department of Defense subtracts from this the quantity of adequate and affordable housing available in the local community. The result is the "construction deficit," the statistic used as the basis for requests for funds to construct or lease additional units.

Formal definitions of what constitutes acceptable housing in the private sector in terms of cost, distance to the base, and various physical characteristics are provided by the Department of Defense [Ref 4:p. 15]. Basically, housing areas located more than thirty miles from the base or requiring more than a one-hour commute are unacceptable. Further, a private sector unit is considered too costly if the rental cost exceeds a military member's housing allowance plus thirty percent of the national median expenditure for housing by military families in that pay grade who reside in the private sector ($\text{rent} > \text{BAQ} + \text{VHA} + 0.3 * \text{national median expenditure}$).

The Department of Defense's method also makes a distinction between private sector housing available for military personnel rather than civilian families. The current market share by pay grade is projected into the future. Thus, if E-4 and below personnel presently occupy ten percent of the acceptable private sector housing, the Department of Defense assumes they will occupy those plus ten percent of any additional units built.

B. CURRENT NAVY FAMILY HOUSING ASSETS

NAVFAC currently manages roughly 58,800 Navy family housing assets in the continental United States [Ref 13]. These units are located in all geographical locations, with the greatest density being 8,000 units in the San Diego, California area. The inventory maintained by NAVFAC has been acquired under various housing programs and averages about 30 years old. The vast majority of these units were built after World War II, but a few structures still remain which were built prior to the war. These relatively few, very costly units are almost exclusively on the "historical register" and must be maintained to certain high standards rather than retired.

The earliest efforts to construct large quantities of government housing began in 1939 when the Lanham Housing Act was introduced. This act provided for the construction of homes to house the workers who were building World War II

military bases [Ref 1:p. 11]. Some of these homes were acquired by the Navy to house military members in the early 1940's, and in fact a few are still carried on NAVFAC's inventory (although it is an insignificant amount).

Most of NAVFAC's present inventory was constructed under the Wherry Housing Act of 1949 and the Capehart Housing Act of 1955. These were programs which allowed the Department of Defense to pay for the construction of homes with mortgages, thus reducing capital expenditures and enabling the Department of Defense to construct many more homes [Ref 1:p. 12]. All units built under the Wherry program have been acquired by the government, and virtually all which remain in use have undergone some type of renovation. Often the renovations have been significant reconfigurations to convert two units into one to keep pace with the Department of Defense's square footage requirements for family housing. All of the units constructed under the Capehart program are also owned by the government, and many of these have also been renovated, although the renovations have tended to be less drastic.

The remainder of NAVFAC's housing inventory has been built under the Military Construction (MILCON) program, mostly since the mid 1960's. The MILCON program allows the Department of Defense to construct new units on military installations, or purchase vacant units from a private party in the local community [Ref 12]. MILCON funds to support the program are approved by Congress in the annual budget.

C. PROPOSED NAVY FAMILY HOUSING NEEDS

There is a fair amount of uncertainty regarding future family housing assets managed by NAVFAC. There appears to be a trend of slightly increasing funding while simultaneously reducing the inventory of assets. The greatest uncertainty arises from the unknowns within the base closure process, which will determine which assets the Navy is to retire.

The trend to slightly increase funding for Navy family housing is the result of various studies done by NAVFAC in recent years. NAVFAC determined that numerous quality of life improvements were needed to bring Navy housing up to Department of Defense standards. These improvements were programmed for in the Program Objectives Memorandum (POM) of the Planning, Programming and Budgeting System. The improvements are scheduled to be funded at least through FY 1998.

NAVFAC established three priorities in the POM process as follows [Ref 12]:

1. Renovation of existing assets.
2. Improve responsiveness to all military members, both occupants and those requiring referral services. These improvements will be in the customer service areas of all housing offices and will encompass housing referral, housing management, housing maintenance, and any other areas required to improve service.
3. Reducing the housing deficit through construction or acquisition of assets.

The outlook is filled with uncertainty due to base closure, but certainly NAVFAC will be forced to retire some housing assets. As bases close so will the housing, although some of this will be offset by units constructed as part of the same base closure process. A conservative estimate is that NAVFAC will retire some 8,000 more units than will be constructed or bought in the continental United States (CONUS) by FY 1999, reducing the CONUS inventory to roughly 50,800.

D. ADVANTAGES AND DISADVANTAGES OF THE NAVY STATUS QUO PROGRAM

The principal advantage of the Navy's status quo program of increasing the percentage of Navy families occupying on-base housing is its contribution to the quality of life of military personnel. The waiting lists for Navy housing indicate increased access to on-base housing would improve the overall quality of life of the military families, assuming Navy housing is a normal good, and military personnel are rational in that they respond to incentives.

The overwhelming majority of military families living in Navy housing have chosen to do so voluntarily (relatively few, usually senior officers, are required to for readiness). The military families are exercising economizing behavior to derive their maximum benefit. Thus, for whatever reason the military family has chosen to live in Navy housing, they have done so to enhance their total quality of life. The military

family may desire to live on-base to take advantage of the close proximity to on-base facilities, to enjoy the camaraderie of living in a military community, to enjoy the added security the base provides, or to respond to economic incentives (especially true in high-cost areas), all of which increase their quality of life.

There are three disadvantages to the Navy's status quo program of increasing the percentage of Navy families occupying on-base housing. First, this policy is potentially more costly than downsizing housing assets as the Forces are downsized. It may be less costly to maintain the present percentage of Navy families in on-base housing than to increase the percentage. Second, current Department of Defense policy, to primarily rely on the local community to provide housing, is contradicted due to the Department of Defense's methodology used to determine the deficit of housing in the civilian sector. Third, constructing new units, or revitalizing existing ones, is a process that takes a considerable amount of time as compared to the civilian sector.

As evidence of the first disadvantage, the Congressional Budget Office (CBO) has studied the long-run costs of Department of Defense and civilian housing, determining it costs more to provide DOD housing than to provide housing in the private sector [Ref 4:p 17]. This is true when the costs of construction and major repairs are considered along with

the operating and maintenance costs. The CBO's methodology compares what the federal government spends to provide military housing to what military families spend in the private sector. Data was compiled by paygrade and geographic distribution. The results of the CBO study show that, on average, the federal government spends about 35 percent more to provide military housing (excluding the costs of federal land) than military personnel choose to spend on housing in the civilian community. The CBO study is discussed further in the Appendix, with particular attention given to the accuracy of the costs and expenses cited.

The second disadvantage to the Navy's status quo program derives from two weaknesses in the methodology used to determine the deficit of housing in the civilian sector. The first weakness is in the determination of the Maximum Allowable Housing Cost (MAHC), and the second is in the calculation of future private sector housing to be occupied by military families.

The MAHC is used by the Department of Defense to indicate whether civilian housing is affordable. This measure is reached for each paygrade when the military member spends their allowance plus 30 percent of the national median expenditure for housing for families in their paygrade. The MAHC is based on housing allowance levels, not total income of a family, and is therefore not a true measurement of economic hardship faced by a military family residing in the private

sector. A military family who receives a basic pay increase offset by an equalizing decrease in allowances (to consider tax implications) would see no change in total income, nor would there be any expected change in housing expenditure [Ref 4:p. 15]. However, raising pay and lowering allowances would cause the Department of Defense to decrease its estimate of affordable housing units available in the private sector, and increase its estimate of military housing units needed. The lack of affordable housing could be an indication that allowances should be increased, not necessarily that new military housing should be constructed.

The second weakness in determining the deficit of housing in the civilian sector is in the projection of future private sector housing to be occupied by military families. The Department of Defense assumes the present percentage of military families occupying private sector housing indicates the number of units the private sector will be able to supply in the future. The Department of Defense further assumes the same percentage of military families will occupy the future supply of private sector housing. This can result in a perpetual increase in the amount of military housing required. The number of military families residing in the private sector is dependent upon the amount of on-base military housing available. The percentage of military families residing in the private sector would be smaller in areas where a large amount of military housing units are available. The end

result is the estimated future requirement for military housing tends to be larger for locations and paygrades which presently benefit from a large number of military housing [Ref 4:p 16].

As an example, assume on-base E-5/E-6 housing is readily available resulting in only ten percent of families in these two paygrades to be housed in the civilian community. The Department of Defense methodology assumes the civilian community can only accommodate ten percent of the E-5/E-6 military families in the future. This assumption is suspect in that it does not truly reflect the civilian housing market. A more traditional long-run supply and demand model, focusing on the civilian housing market, could greatly alter the housing deficit cited for many locations.

The third disadvantage to the Navy's status quo program of increasing the percentage of Navy families occupying on-base housing is that constructing new units, or revitalizing existing ones, is a process that takes a considerable amount of time as compared to the civilian sector. For many military housing construction endeavors, up to ten years expire between the identification of a housing deficit and the fulfillment of that deficit. The military construction process is cumbersome due to all the reporting and documentation requirements. Included are a market analysis, budget planning, environmental assessment, site engineering investigation, Congressional authorization and appropriation, bid preparation and

selection, construction, acceptance and occupation. This process takes a minimum of four years, but to proceed this rapidly the project must be considered so critical that it is placed in the earliest year of the Program Objective Memorandum (POM) upon identification. If the requirement is placed in an outyear of the Future Years Defense Program (FYDP) then it may take the full ten years. Some projects continuously get pushed down in priority and never get funded.

IV. NAVY FAMILY HOUSING PUBLIC/PRIVATE VENTURES

A. SECTION 801 BUILD TO LEASE

The 1984 Military Construction Authorization Act established the Section 801 Build to Lease program. Under this legislation, the government can lease a project built by a private developer [Ref 10:p. 1]. This legislation, which has been renewed annually with relatively minor changes, authorizes the Department of Defense to lease a newly constructed housing project from a private developer for up to twenty years. The legislation authorizes the Secretary of each service to enter into a specified number of contracts for housing projects of approximately 300 units. The number of contracts and size of the projects have varied each year, dependent upon Congressional legislation [Ref 10:p. 1].

The build to lease projects are authorized only in those areas where a documented and validated deficit in family housing exists. An economic analysis demonstrating an 801 lease is cost effective compared to other housing alternatives must be submitted to Congress for approval. Congress has 21 days to respond or the project is considered approved [Ref 6:p. 25].

The dollar amount of the lease is divided into two separate rents. The shelter rent is the amount needed to

amortize the cost of the construction and is held constant throughout the term of the lease. The maintenance rent is meant to cover the costs of maintaining the development after construction. This rent will change based on the Housing, Shelter, Maintenance and Repair Index of the "Economic Indicators", which are prepared for Congress by the Council of Economic Advisors. Additionally, the government will pay 80 percent of any yearly increases in total general real estate taxes after the second year of the agreement [Ref 6:p. 7].

Various other specific conditions and restrictions apply to the Section 801 Build to Lease program [Ref 6:p. 7-8]:

1. The project must be built on or near a military installation.
2. Eligible service members are assigned quarters rent-free (member forfeits BAQ and VHA).
3. Contracts are awarded through public advertising, competitive bidding, and negotiated contracting procedures.
4. Contracts may provide for the contractor to maintain and operate the project throughout the duration of the lease.
5. Units must be built to Department of Defense specifications.
6. The lease is set for a maximum of 20 years after the completion of the construction.

The 801 Build to Lease program has two alternatives. First, the contractor may build the housing project a

available government land on the military installation. Upon expiration of the lease the government may purchase or continue to lease the development. If the government is not interested in these two options then they can lease the land containing the development to the contractor for the contractor's own private use.

The second alternative authorizes the Department of Defense to lease a housing development which is located off base. Upon expiration of this lease the government does not have the option of renewing the lease, but only has the option of purchasing the development for fair market value or allowing the lease to expire [Ref 11:p. 6].

B. SECTION 802 RENTAL GUARANTEE

The Section 802 Rental Guarantee program was also passed under the 1984 Military Construction Authorization Act. Under this legislation the Department of Defense is authorized to guarantee up to 97 percent occupancy of a privately owned housing development when the owner gives first consideration for rental to service members. Again, the Secretary of each service is authorized to enter into a specified number of contracts for housing projects of approximately 300 units. The number of contracts and size of the projects have varied each year, dependent upon Congressional legislation [Ref 10:p. 1].

As with Section 801, the 802 Rental Guarantee projects are authorized only in those areas where a documented and validated deficit in family housing exists. An economic analysis demonstrating an 802 lease is cost effective compared to other housing alternatives must be submitted to Congress for approval. Congress has 21 days to respond or the project is considered approved [Ref 6:p. 25].

Section 802 Rental Guarantee carries the same conditions and restrictions as Section 801 Build to Lease, with the following exceptions [Ref 10:p. 7-8]:

1. The rental guarantee may not exceed 97 percent of the units.
2. The individual service member pays the rent expenses. The Department of Defense is authorized to pay a portion of the utility costs in the lease agreement to reduce the costs to the individual service members.
3. Initial rents shall not be more than rents for comparable units in the same general area. Future rents can be revised to reflect market conditions.
4. The agreed upon rental guarantee amount shall not be more than an amount equal to the shelter rent of the units as determined by amortizing initial construction costs.
5. The rental guarantee is limited to a maximum of 25 years and is not renewable.
6. If the owner does not maintain and operate the development at a satisfactory level, then the contract can be terminated.

C. TITLE 10 2667 LEASE

Title 10 USC Section 2667 has existed for a number of years. It was intended to give the Secretaries of the services the authority to lease land under their jurisdiction to promote the public interest or national defense. It was first used to construct family housing by the Army in a highly successful program at Ford Ord, California. The private firm involved at Fort Ord both developed and managed the housing units with very positive results, however the closure of Fort Ord has prevented this site from being studied further. As the military families have transferred, a small portion of these units are being rented to civilians, while another undisclosed portion will be transferred to the Naval Postgraduate's plant property for custody and occupancy by students. The future of the remainder of these units is uncertain.

The Title 10 2667 Lease program is similar to both the 801 and 802 programs in that it utilizes the private sector to build family housing in an area where an established deficit exists. It differs from the Section 801 and 802 programs in the following ways [Ref 6:p. 27]:

1. Housing units are not required to be built to the Department of Defense specifications. They will undergo a constructibility review by the Department of Defense, but the plans and specifications are not limited by Department of Defense standard specifications.

2. Lease periods are set for a minimum of five years, but there is no maximum duration.
3. Lease authority exists such that the service Secretary may lease non-excess federal property under their jurisdiction for construction purposes. This gives the service Secretary flexibility in choosing the construction site.
4. All Section 2667 leases must be approved by the House Armed Services Committee.
5. Section 2667 lease projects are not affected by the Davis-Bacon Wage Act. This act requires that standard wages, set by the Department of Labor, be paid to construction workers on most federal projects.

D. ADVANTAGES AND DISADVANTAGES OF PUBLIC/PRIVATE VENTURES

The prime advantage of using one of the public/private ventures vice military construction (MILCON) is the potential cost savings. In fact, verifiable cost savings are the requirement to obtain the approval for a public/private venture. This verification is evidenced through a theoretical "rent cap" calculation, demonstrating the net present value of the public/private venture is at least five percent less costly than it would be to build under the MILCON program. The "rent cap" calculation is comprised of the payments to the developer over the life of the lease. The net present values for the 801 or 802 projects are strengthened because both have zero initial outlays [Ref 6:p. 42]. Dollars do not have to be provided in the Defense Authorization Bill to finance these programs.

Section 2667 projects have further potential for cost savings since the contractor is not restricted to the constraints imposed by Department of Defense designs, nor is the contractor required to pay the prevailing wages specified in the Davis-Bacon Act. According to an estimate provided by the National Association of Home Builders, the design constraints imposed by the Department of Defense add twelve percent to the cost of military housing as compared to similar private sector housing, with no significant increase in quality [Ref 14:p. 2]. The Davis-Bacon Act adds an additional five to fifteen percent to the construction costs for MILCON projects, according to some estimates [Ref 2:p. 32]. These two areas provide the potential for large cost savings.

The disadvantages of public/private ventures, revolving around legal and accounting problems, have rendered these programs completely ineffective over the past five years. The Naval Facilities Engineering Command will not pursue the public/private ventures until the problems are resolved, thus restricting their available options.

The accounting problem results from the Office of Management and Budget's requirement that all lease purchases be scored. Scoring requires Congressional authorization and appropriation for the total cost of the proposed lease liability in the first year, even though payments would be made throughout the life of the lease. The Office of Management and Budget requires this to ensure there is no

circumvention of the Gramm-Rudman-Hollings Act, which prohibits the government from entering into a contract that obligates itself beyond the current fiscal year without authorization from Congress.

The legal problems arise at the end of the lease period for any public/private venture undertaken on government property. There are unanswered questions pertaining to the proper compensation to a contractor who has clearly improved the government land [Ref 13]. Without clear precedence set, the legal personnel at the Naval Facilities Engineering Command advise against any such undertakings. Both these problems have kept all the public/private ventures from reaching their full potential.

V. DOWNSIZING OF NAVY FAMILY HOUSING ASSETS

A. MAINTAIN CURRENT PERCENTAGE OF FAMILIES IN NAVY HOUSING

There has been a gradual trend to rely on the Department of Defense housing more and more over the years since World War II. This appears contrary to the Department of Defense's policy of relying on the civilian community first and foremost, before any housing is acquired or constructed by the Department of Defense. This increased reliance has occurred over the past 50 years and has been tremendously difficult to detect at annual budget reviews. The Congressional Budget Office suggests that it could be halted by a legislated cap on the total number of Department of Defense housing units or on the percentage of military families who can live in Department of Defense housing [Ref 4:p. xv].

Under this alternative, the current percentage of Navy families residing in Navy family housing would be held constant. The intended result is to avoid further reliance on the Department of Defense housing without harming the quality of military life [Ref 4:p. xiv]. Thus, the percentage of families living in Navy housing in 1999 would remain at the 1993 level of 24 percent instead of rising to 38 percent, as it would in the Department of Defense plan.

The force drawdown and base closures would be used to reduce housing inventories under this alternative while still maintaining access to family housing at the present rate. The majority of units taken out of service would be those requiring renovation or revitalization in the near future. Removing them would allow significant up-front savings in revitalization costs without any increase in the revitalization backlog [Ref 4:p. 35].

B. PAY AND ALLOWANCE INCENTIVES TO REDUCE DEMAND FOR NAVY HOUSING

The result of this option would be to reduce the demand for Navy family housing by effectively raising the price families are paying for it. An increase in a members BAQ and VHA would certainly alter their behavior when choosing between the Department of Defense housing and private sector housing based on simple supply and demand models.

Under this option, waiting lists for the Department of Defense family housing should diminish in response to the higher prices service members would pay for that housing [Ref 4:p. 44]. If allowances were set high enough, many installations would have a surplus of housing units which would allow the inventory of housing assets to be reduced. This would also reduce the reliance on the Department of Defense to provide housing, and more closely match official

Department of Defense policy to rely on the private sector for housing.

The allowances would have to be increased in a manner which is equitable with local market conditions, and in such a way as to overcome four fundamental differences between the decision process of a member of the armed forces renting in the civilian community and a non-Department of Defense (non-DOD) person [Ref 3:p. 49]:

1. Military families find themselves in unfamiliar housing markets more often than civilian families. This will probably cause them to make housing decisions on the basis of poorer information. Thus on the average, the military family may be expected to pay more for housing of a given type than their civilian counterparts. This tends to hold true in spite of the military's efforts to provide housing referral services. The civilian family tends to be much more familiar with an area of consideration as they normally move to a different home within the same geographic region of their present one.
2. Military families tend not to remain in a rented home as long as civilian families and will not benefit as much from the rental discounts that civilian families receive. Again, the result is that the military family may be expected to pay more for housing of a given type than their civilian counterparts.
3. Military families that receive VHA with its offset policy, but do not spend more than their allowance on housing, perceive the existence of effective marginal subsidies to housing and respond by increasing the total amount, including the allowance, that they spend on housing. It is estimated that one in eight households receiving VHA falls into this category, thus for some military families higher expenditures on rental property would be observed [Ref 3:p. 50].
4. Military families can expect to remain in homes for a fairly short time, thus they can more closely tailor those homes to their desired consumption of housing.

This has offsetting effects. On the one hand, a family will skip the starter home and thus be paying more rent than their counterpart, while on the other hand a family may not buy a home to grow into thus paying less [Ref 3:p. 51].

There are numerous similarities between the military and civilian families regarding housing. Both usually start out as renters, will receive discounts from their landlords as they remain longer in a home, and will increase their demand for housing expenditures as they mature and their permanent incomes grow. This transition from renting to owning and occupying takes longer for the military family than the civilian family for four reasons [Ref 3:p. 51]:

1. The stability that civilian families tend to achieve over time does not come to the military family since military families move more frequently and find it harder to justify the fixed costs of buying a home. The civilian family is able to take a long term point of view that allows them to amortize the fixed costs over more time and to hold the house as a hedge for use in the future.
2. The military families not only move more frequently, but they do so at irregular intervals. Most military families have little control over permanent changes of station (PCS), and this uncertainty about how long they will live in an area reduces the relative attractiveness of owning a home for the typical risk averse household. Often military families must endure forced separations when their house cannot be sold in a timely manner upon the transfer of the sponsor. The result tends to be a delay in the decision to switch from renting to owning and occupying.
3. The military families receive a larger portion of their gross income as nontaxable benefits than do civilian families. Thus at comparable points in their life

cycles, military families will have a lower taxable income and will often face lower marginal tax rates than their civilian counterparts. Since the tax benefits of home ownership are approximately proportional to the marginal tax rate, the tax code tends to offer the military family a smaller tax advantage from owning a home than it offers a comparable civilian family.

4. Military families that expect to receive military retirement may save differently from otherwise comparable civilian families. A military family may view their future retirement as a form of forced savings which displaces the need for other forms of savings. A comparable civilian family without such a retirement will tend to take a much more active interest in accumulating assets, with a home being the first major asset sought. Again, this defers the military family from transitioning from renting to owning and occupying.

Consolidating all the differences between the military and civilian families it is clear that the military families will tend to spend more money for less housing than civilian families. Exactly how much is most difficult to derive. Frequent moves and uncertainty about them, combined with the smaller tax benefit from home ownership, raises the effective price of housing services to the military families. Thus the pattern is clear, but the magnitude is uncertain.

C. ADVANTAGES AND DISADVANTAGES OF DOWNSIZING NAVY FAMILY HOUSING ASSETS

Potential cost savings is the principal advantage of downsizing Navy family housing assets to maintain the current percentage of military families occupying it. The majority of these savings would be in the next five years as Navy family

housing assets are retired at the same rate as the Force drawdown. The emphasis would be to retire the housing units currently in the revitalization backlog to maximize the savings. The Congressional Budget Office has estimated the potential savings for a permanent housing inventory reduction program [Ref 4:p. 20]. The details of the study are provided in the Appendix, and are summarized as follows:

1. The present discounted value of federal savings from retiring rather than replacing a military housing unit would amount to \$140,000 over the expected service life of a typical replacement unit. The expected service life is assumed to be 57 years. This takes into account savings from not constructing, maintaining, or operating the unit, as well as the costs of providing housing allowances to an additional family.
2. The present discounted value of federal savings from retiring rather than replacing a military housing unit as part of a permanent inventory reduction would amount to \$170,000. The discounted savings from eliminating subsequent projects is included in this figure as well as the savings determined above.
3. The present discounted value of resource savings from retiring rather than replacing a military housing unit would amount to \$90,000 over the expected service life of the replacement unit. Resource savings are federal savings minus the additional out-of-pocket costs military families must expend to obtain housing in the civilian community.
4. The present discounted value of resource savings from retiring rather than replacing a military housing unit as part of a permanent inventory reduction would amount to \$110,000.
5. The present discounted value of federal savings from retiring rather than revitalizing a military housing unit would amount to \$70,000 over the additional service life of the revitalized unit (assumed to be 22 years).

6. The present discounted value of federal savings from retiring rather than revitalizing a military housing unit as part of a permanent inventory reduction would amount to \$150,000 over the additional service life of the revitalized unit.
7. The present discounted value of resource savings from retiring rather than revitalizing a military housing unit would amount to \$40,000.
8. The present discounted value of resource savings from retiring rather than revitalizing a military housing unit as part of a permanent inventory reduction would amount to \$100,000.

The detrimental impact on the quality of life of the military family is the principal disadvantage to downsizing the inventory of Navy housing units. The Department of Defense is committed to continually improving the quality of life of all military personnel. Downsizing the family housing inventory would, at best, hold the quality of life constant vice improving it. The impact would be felt most by the E-4 and below personnel who would be among the first to lose access to Navy family housing. The E-4 and below personnel tend to be the group with the most severe need for Navy family housing and are normally assigned to the units that tend to be in the greatest need of revitalization. Thus by retiring these units this group feels the brunt of the impact. To overcome these disadvantages housing units would need to be redistributed from more senior personnel to the junior personnel. Further, pay and/or allowance increases would be necessary.

VI. ANALYSIS

A. QUANTITATIVE ANALYSIS

The quantitative analysis to follow is a comparison of the Department of Defense's status quo option and the Congressional Budget Office's proposed downsizing option as they pertain to Navy housing assets located in the continental United States. Numbers relating to the status quo option are rough POM figures obtained from NAVFAC [Ref 15 and Ref 17]. Downsizing option data has been derived based on data provided by the Congressional Budget Office [Ref 4].

Data has not been derived for the public/private ventures as they are possible under either the downsizing or status quo options. The public/private option is a site-specific decision based on a local cost-benefit analysis which must portray at least a five percent savings before approval. Thus the public/private venture option will be intentionally excluded from the analysis. Additional savings could be generated for the status quo or downsizing options if the scoring problem noted earlier can be alleviated to make the public/private ventures a viable option for providing new housing where required.

Table 1 summarizes the data for the Department of Defense status quo program from fiscal year 1994 through fiscal year

2001. The percentage of Navy families occupying on-base housing is proposed to increase from 24 percent to 34 percent. Housing assets are proposed to decrease from 58,800 units to roughly 50,800 units. However the number of Navy families stationed in the continental United States will decrease at a greater rate than housing assets are retired, resulting in the increase in families housed in on-base housing. All figures are in millions of 1993 dollars.

TABLE 1 NAVY STATUS QUO PROGRAM

ITEM	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01
CONUS HOUSING INVENTORY	58800	58200	57200	54200	52200	50800	50800	50800
% NAVY FAMILIES HOUSED	24%	26%	28%	30%	32%	33%	33%	34%
MILCON								
NEW CONST/REPLACEMENT	\$164	\$21	\$93	\$90	\$58	\$63	\$64	\$66
REVITALIZATION	\$159	\$138	\$176	\$181	\$189	\$197	\$191	\$197
DESIGN	\$21	\$23	\$15	\$15	\$14	\$15	\$15	\$15
TOTAL MILCON	\$344	\$182	\$284	\$286	\$261	\$275	\$270	\$278
OPERATIONS/MAINTENANCE								
OPERATIONS	\$400	\$298	\$292	\$300	\$308	\$319	\$328	\$338
MAINTENANCE	\$265	\$343	\$350	\$358	\$351	\$362	\$373	\$385
TOTAL O&M	\$665	\$641	\$642	\$658	\$659	\$681	\$701	\$723
GRAND TOTAL (MILCON & O&M)	\$1,009	\$823	\$926	\$944	\$920	\$956	\$971	\$1,001

The Congressional Budget Office's proposed downsizing option is summarized in Table 2. Under this option the

percentage of Navy families residing in on-base housing would remain constant at 24 percent allowing more housing assets to be retired. Savings due to possible maintenance or management staff reductions are not addressed since they could not be accurately quantified. All figures are again in millions of 1993 dollars.

TABLE 2 DOWNSIZING OPTION POTENTIAL SAVINGS

ITEM	PY 94	PY 95	PY 96	PY 97	PY 98	PY 99	PY 00	PY 01
CONUS HOUSING INVENTORY	58800	53700	49100	43400	39200	37000	37000	35900
% NAVY FAMILIES HOUSED	24%	24%	24%	24%	24%	24%	24%	24%
PROJECTED SAVINGS								
MILCON	0	\$92	\$92	\$92	\$92	\$92	0	0
O&M	0	\$24	\$24	\$24	\$24	\$24	\$56	\$56
SCHOOL IMPACT AID		8	8	8	8	8	16	16
PROJECTED COSTS								
HOUSING ALLOWANCES	0	(\$30)	(\$30)	(\$30)	(\$30)	(\$30)	(\$64)	(\$64)
TOTAL PROJECTED SAVINGS	\$0	\$94	\$94	\$94	\$94	\$94	\$8	\$8

This option produces significant up-front savings as the majority of the assets being retired would save revitalization costs. NAVFAC currently maintains a revitalization backlog of roughly 2.4 billion dollars [Ref 17]. Thus, between fiscal year 1995 and fiscal year 1999 revitalization costs would be decreased and the backlog would not increase. In fact, the backlog could be decreased with the savings generated to

increase the overall quality of life of the military family. The outyears (fiscal year 2000 and beyond) produce savings mainly from reduced operations and maintenance costs due to a smaller inventory.

School impact aid savings referred to are a direct result of having less military families living on-base. Payments are made to local governments based on the number of dependents living on federal land, thus exempt from paying local property taxes. The payments made on behalf of dependents residing on-base are higher than the payments for those living in the private sector.

The savings referred to in Table 2 are strictly budgetary. To effectively assess the alternatives, the Office of Management and Budget requires a cost-benefit analysis of the type described in the next section to be conducted [Ref 26].

B. QUALITATIVE ANALYSIS

The qualitative analysis in this section is based on a housing study conducted by the Air Force Academy [Ref 5], with inputs from the Congressional Budget Office [Ref 4], and the Rand Corporation [Ref 3]. Various assumptions are inherent in the analysis concerning private housing markets near military installations. It is assumed that these local housing markets are perfectly competitive, and military families are free to choose between on-base or private sector housing in response to market conditions. Military families thus have full access

to information concerning prices and corresponding amounts of housing service. This information is obtained through housing referral services offered at the military installation, real estate agents or other sources.

Assumptions concerning benefits and costs are also inherent in this analysis. Only the benefits and costs which pertain to the military family and the costs which pertain to the Department of Defense will be considered. All other economic entities (such as landlords, home builders and providers of non-housing goods) which are affected by a military family's decision to reside on-base will be excluded. However, as long as the prices facing these entities do not change, the analysis of the costs and benefits to the military families and the Department of Defense fully reflect the social costs. The benefits to the Department of Defense resulting from having a military community residing on base are also not taken into account when applying this framework. Readiness, morale and esprit de corps are likely to be enhanced, but difficult to accurately work into the model.

Based on these assumptions, there are three alternative housing consumption patterns associated with military families choosing to reside in on-base housing instead of private sector housing. First, a military family may consume more housing service in on-base housing, but at a point below their demand curve (less quantity demanded), as compared to private sector housing. Second, a military family may again consume

more housing service in on-base housing as compared to private sector housing, however the consumption will be at a point above the demand curve (more quantity demanded), but at a price below that of the same housing service in the private sector. Finally, a military family may consume less housing service in on-base housing as compared to private sector housing.

Housing service is defined as [Ref 5:p. 4]:
an unobservable good emitted in some quantity by each dwelling unit during each period of time. It is the one and only thing in a dwelling unit to which consumers attach value. Intuitively, the quantity of housing service emitted by a dwelling unit can be thought of as an index of both quantitative and qualitative attributes.

In an attempt to relate housing service to a tangible quantitative measure, consider that each dwelling represents a unique bundle of characteristics. It has a location, age, size, design and other attributes which distinguish it from other units. Families tend to consume housing characteristics in these bundles [Ref 18:p. 185]. Perhaps the most convenient measure to conceptualize housing service is square feet. Housing characteristics have negative own-price effects [Ref 18:p. 185]. That is, in cities where housing cost more per square foot, other things being the same, people tend to demand smaller houses.

Further, housing characteristics are complementary with living space [Ref 18:p. 185]. People tend to consume housing characteristics in bundles of progressively higher quality

rather than making substitutions among characteristics and purchasing bundles that are quite heterogeneous in terms of quality [Ref 18:p. 185]. Thus, in the private sector, square footage is a close approximation of the utility referred to as housing service.

One complication to using square footage as an approximation of housing service arises due to differing facility maintenance programs between on-base and private sector dwellings. The Department of Defense tends to spend more on day-to-day maintenance thus increasing the value and service life of on-base housing units [Ref 25]. The Department of Defense directs on-base housing units to be maintained at a high standard to house military families at a consistent paygrade. Private sector housing units could house families of decreasing incomes as the dwelling ages. Therefore, an amount of square footage in an on-base housing unit could provide a greater amount of housing service than an equal amount of square footage in a private sector dwelling. The result of this complication is that square footage cannot be used as an absolute approximation of housing service when comparing on-base and private sector housing alternatives.

The following illustrations will utilize the income-compensated demand curve, which represents the amount of housing service families are willing to purchase as a function of its price, holding welfare constant. Normally, the results of a change in price could be separated into an income effect

and a substitution effect. The income-compensated demand curve shows, for any change in price, the resulting change in quantity demanded due to the substitution effect alone [Ref 20:p. 152]. Thus, the following demand curves show what the military families will consume if there is no income effect. Further, assuming housing service is a normal good, the income-compensated demand curve will be steeper than the ordinary demand curve [Ref 20:p. 153].

In the long run, one would expect P_N to be lower than P_C for various reasons. In general, the station Public Works forces are sized to support the readiness of the base resulting in the fixed set up costs being incurred. The government housing maintenance organization will augment the Public Works' forces with relatively minor tool and material additions. As a result, it is reasonable to hypothesize that the day-to-day maintenance costs per unit of housing service provided are cheaper for on-base housing than for comparable off-base housing. This is true even though more money may be spent by the government on each comparably sized unit. Relative to private sector housing, the quantity of housing service provided is increased to such an extent that, on net, P_N can be reasonably hypothesized to be lower than P_C .

Other factors which contribute to P_N being lower than P_C are due to the base infrastructure. Utility plants and mains are required to support base facilities. These are expanded

to accommodate on-base housing which is cheaper than having to build all new utility services. Additionally, support services, such as police and fire protection, are also set up to support the base. They too are easily expanded to service on-base housing areas. The savings generated by avoiding initial set up costs and sharing fixed overhead costs tends to make P_N less than P_C .

Missing from this discussion concerning P_N are the costs and benefits associated with the use of federal land for on-base housing. Accounting for the land issue should reduce P_N further. Many military installations had their boundaries established well before their on-base housing requirements were defined. On-base housing units were constructed on excess space that has low opportunity cost. The land utilized would represent a cost only if, in the absence of that housing, the land would be sold or used for another facility.

The following notation will apply to all three figures in this section:

- Q_N : The quantity of housing service to which a military family is entitled to.
- P_N : The price per unit of Q_N .
(P_N = cost to the government/ Q_N)
- Q_C : The quantity of housing service in the private sector which represents the military family's next best alternative.
- P_C : The price per unit of Q_C .

The first alternative is illustrated in Figure 1. The consumption is at point F, which is below the demand curve. The military family represented in this example has chosen to consume more housing service by living in on-base housing as compared to their next best alternative in the private sector, indicated at point A.

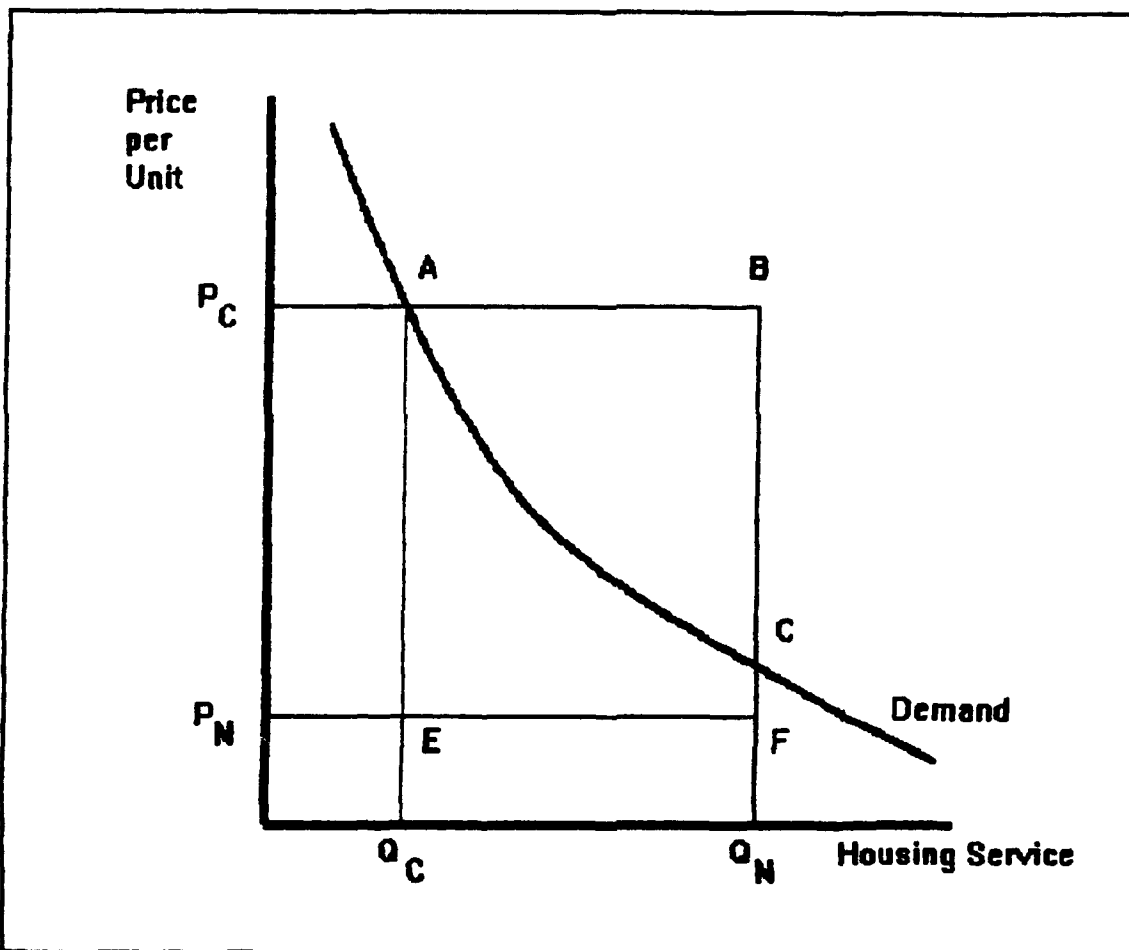


Figure 1 Alternative 1

The military family has chosen to consume Q_N housing service, which is greater than the private sector alternative by the quantity $Q_N - Q_C$. Private housing service consumption

for this family, point A, would have resulted in a total outlay of $P_c Q_c$.

The net benefit to the military family in this alternative is equal to the increase in consumer surplus at point F compared to point A. This change in consumer surplus is the difference between what a consumer is willing to pay for a good and what they actually pay when buying it [Ref 19:p. 114]. Put another way, the increase in consumer surplus is the difference between the value of housing service (the maximum amount a person will pay) and the price of housing service (the amount actually paid) [Ref 21:p. 168]. Thus, the net benefit is due to the increase in housing service consumed and the increased income available to spend on non-housing service. The net benefit (change in consumer surplus) is represented by the area $ACFE + P_c AEP_F = P_c ACFP_F$.

Figure 2 illustrates the second alternative housing consumption pattern associated with military families choosing to reside in on-base housing instead of private sector housing. In this example, the military family again consumes more housing service in on-base housing as compared to private sector housing. The consumption will be at point G, which is above the demand curve, but at a price below that of the same housing service in the private sector.

The military family's next best private sector alternative is again at point A, thus the increased housing service

consumed by the military family is $Q_I - Q_C$. The total outlay for the next best private alternative would be $P_C Q_C$.

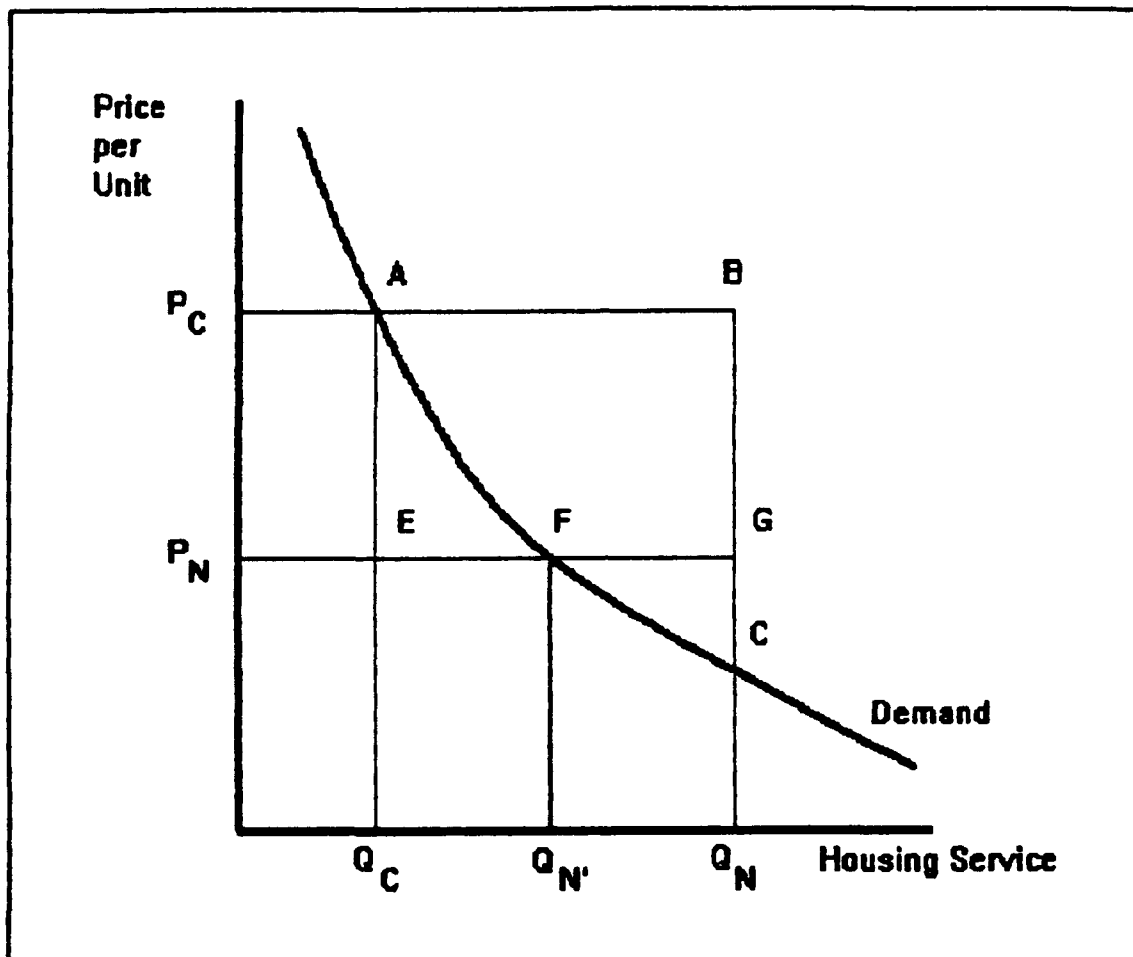


Figure 2 Alternative 2

The net benefit to the military family in this alternative can be broken down and analyzed in two parts; the housing service from Q_C to $Q_{N'}$ and from $Q_{N'}$ to Q_N . The net benefit to the family for housing service between Q_C and $Q_{N'}$ is equal to the increase in consumer surplus at point F compared to point A, which is the area $P_C A F P_N$. For housing service between $Q_{N'}$ and Q_N the outlay exceeds the benefit by the area $F G C$. Thus,

the total net benefit to the military family is equal to P_cAFP_f minus FGC.

The final alternative housing consumption pattern associated with military families choosing to reside in on-base housing instead of private sector housing is illustrated in Figure 3. The military family consumes less housing service in on-base housing instead of private sector housing by the quantity $Q_c - Q_f$. The consumption is at point F, which is below the demand curve. Again, the next best alternative in the private sector is point A, which would result in a total outlay of P_cQ_c .

The net benefit to the military family in this example is equal to the increase in consumer surplus at point F compared to point A. This is represented by P_cBFP_f minus ABC.

With the three alternatives in mind, the goal is to portray that the Department of Defense has an economic justification to provide on-base housing when considering qualitative as well as quantitative data. Essentially, if an average (mean) net social benefit per family for a given paygrade is obtained, then there is an economic justification for the Department of Defense to provide on-base housing [Ref 5:p. 17].

The illustrations portrayed in Figures 1, 2 and 3 result in a net benefit to the military family as evidenced by the increases in consumer surplus resulting from the military families' choices to live in on-base housing as opposed to

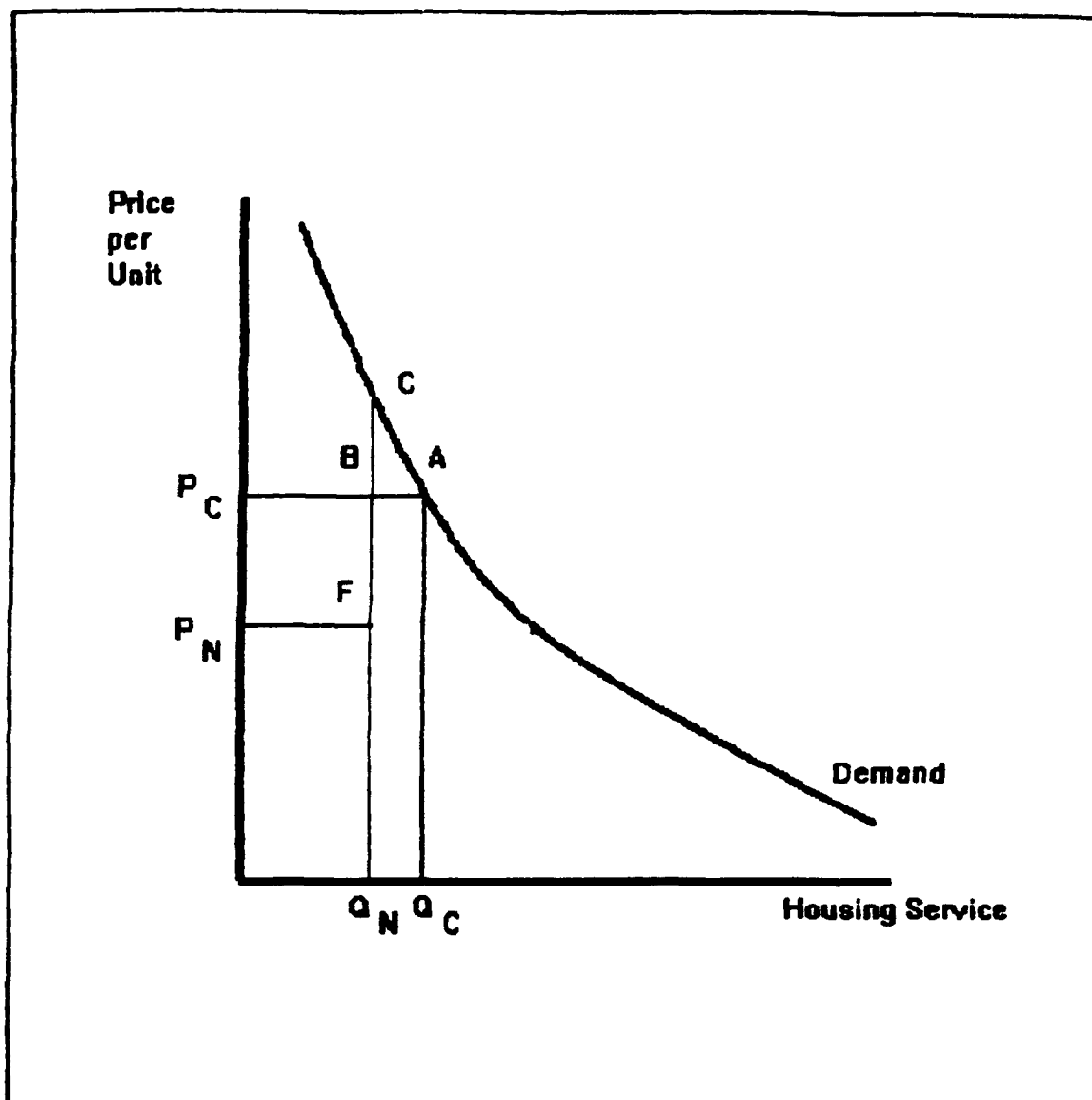


Figure 3 Alternative 3

living in the private sector. It thus becomes critical to consider the qualitative issues in addition to the quantitative issues. Empirical studies performed by the United States Air Force Academy [Ref 5] have confirmed that there is an average net social benefit per family for all

paygrades, thus providing an economic justification for the Department of Defense to provide on-base housing.

VII. RECOMMENDATIONS AND CONCLUSIONS

A. RECOMMENDATIONS

Three recommendations arise as a result of this research. First, the procedures used to set VHA rates in geographical regions should be revised. Measures should be taken to consider the local housing market instead of only the actual expenditures of the military families residing in the private sector. Second, the housing deficit should be determined by a long-run housing market analysis instead of a straight projection of the current market share occupied by military families in the private sector. Finally, the scoring issue needs to be resolved to make the public/private ventures a viable option.

1. Revise VHA Determination Procedures

Currently, the Department of Defense sets VHA rates for geographic regions based on actual expenditures of military families residing in the private sector. The problem with this method is a result of the economizing behavior of the rational military family. Military families living in high cost areas tend to economize and get less housing service than those in lower cost areas.

Figure 4 illustrates the analysis currently used by the Department of Defense. The typical military family's

demand curve is portrayed by D. The demand curve assumes that an increase in income will result in an increase in demand for housing service when price is held constant. Further, an increase in price will result in a decreased demand for housing service when income is held constant [Ref 3:p. 87].

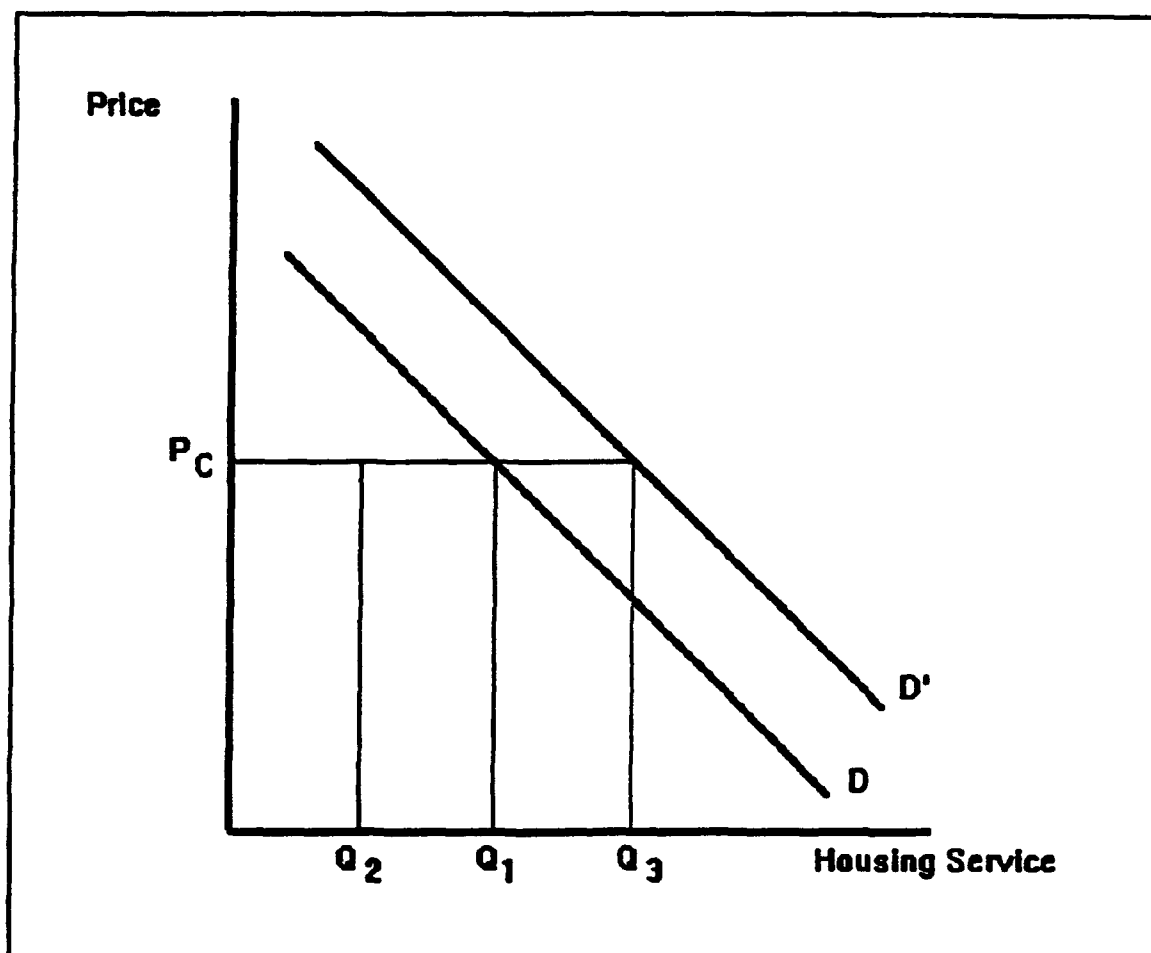


Figure 4 Long-Run Housing Market Analysis

These assumptions concerning demand are consistent with empirical studies of the elasticities of demand for housing service which estimate the income elasticity to range

from 1.2 [Ref 18:p. 211] to 1.5 [Ref 18:p. 91] and the price elasticity to range from -0.55 [Ref 19:p. 112] to -1.2 [Ref 18:p. 211].

In this illustration, when the local market price equals P_c the military family will consume Q_1 units of housing service for a total outlay equal to $P_c Q_1$. The demand curve shifts to D' with the addition of VHA to the military family's income, however the additional spending on housing service may not equal the VHA. As a result of the VHA, the military family buys Q_2 additional units of housing service at price P_c . The total consumption of housing service by the military family in this example is then Q_2 .

Before discussing a recommended approach to determining VHA, it may be useful to review current Department of Defense procedures for calculating VHA. The Department of Defense's current goal is to set VHA rates that vary for each geographical region and each paygrade, and are related to the standard for square feet and quality that the Department of Defense has specified. The resulting VHA calculation then is as follows: $VHA = P_1 - BAQ - (0.15 * I)$. The $(0.15 * I)$ term represents the 15 percent out-of-pocket expenditures the Department of Defense has established for military families residing in the private sector, and the P_1 term reflects the price of an approved dwelling. Values for P_1 could possibly

be obtained from Department of Housing, and Urban Development statistics on fair market rents.

A change in the VHA determination procedures would tend to make the allowances fairer to families stationed in high cost regions. As stated earlier, military families in high cost regions hold down expenditures by purchasing less housing. These families tend to reside in smaller units or units of lesser quality than the military families stationed in lower cost regions. Because the current VHA system bases the levels of allowances on local expenditures by military personnel, allowances in high cost locations reflect the cost of lower quality units [Ref 4:p. 47].

Figure 5 illustrates the recommended VHA determination procedure. Consider the effect a military family will feel when transferred from a low cost to a high cost region. Again, the compensated demand curve is portrayed. First, assume the military family transfers from Norfolk, VA, where the price of housing is \$1 per unit, to Washington, D.C. where the price of housing is doubled. If the military family consumed 900 units of housing service in Norfolk at \$1 per unit, then at \$2 per unit in Washington they will consume less. Next, assume the military family will consume 600 units at the higher price per unit.

The military family will spend more money in Washington for less house than they had in Norfolk. This is the disparity caused by the current VHA determination

procedures. The net loss to the military family is equal to the decreased consumer surplus due to the move from Norfolk to Washington [Ref 3:p. 16]. This is represented by areas A and B in Figure 5. Thus, using Norfolk as the baseline, then areas

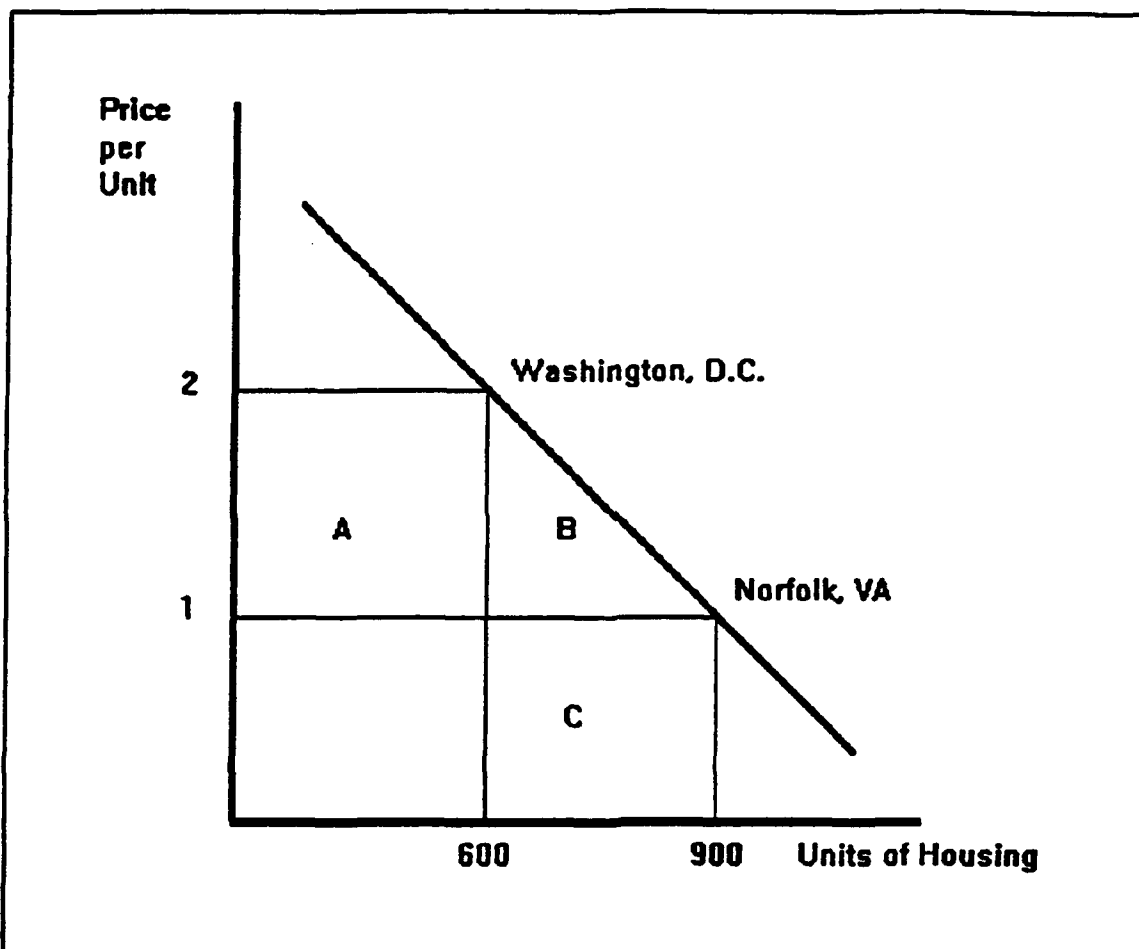


Figure 5 Possible Effect of PCS Transfer

A and B would represent the extra VHA a military family would need to live at the same level of housing service in Washington, D.C. Further analysis would be required to

determine which region would become the baseline, but this would be the procedure used to determine VHA entitlements.

2. Revise Housing Deficit Determination Procedures

The Department of Defense determines the projected housing deficit in any geographical location by holding the current market share constant for each paygrade. This assumes the present percentage of military families occupying private sector housing indicates the number of units the private sector will be able to supply in the future and that the same percentage of military families will occupy the future supply of private sector housing. As an example, assume on-base E-5/E-6 housing is readily available resulting in only ten percent of families in these two paygrades to be housed in the civilian community. The Department of Defense methodology assumes the civilian community can only accommodate ten percent of the E-5/E-6 military families in the future. This assumption is suspect in that it does not truly reflect the civilian housing market. A more traditional long-run supply and demand model, focusing on the civilian housing market, could greatly alter the housing deficit cited for many locations.

Figure 6 illustrates the proposed market analysis. D_c represents the demand curve for a civilian community assuming there is no local military installation. D_{c+m} represents the total demand curve when the military families are considered.

S_{LR} is the long run supply curve. Over the long run, analysts believe that the supply of housing in most U.S. markets will be quite elastic [Ref 4:p. 58]. This is related to the time it takes for suppliers to respond to possible profits, thus encouraging new construction and improvements to existing housing assets.

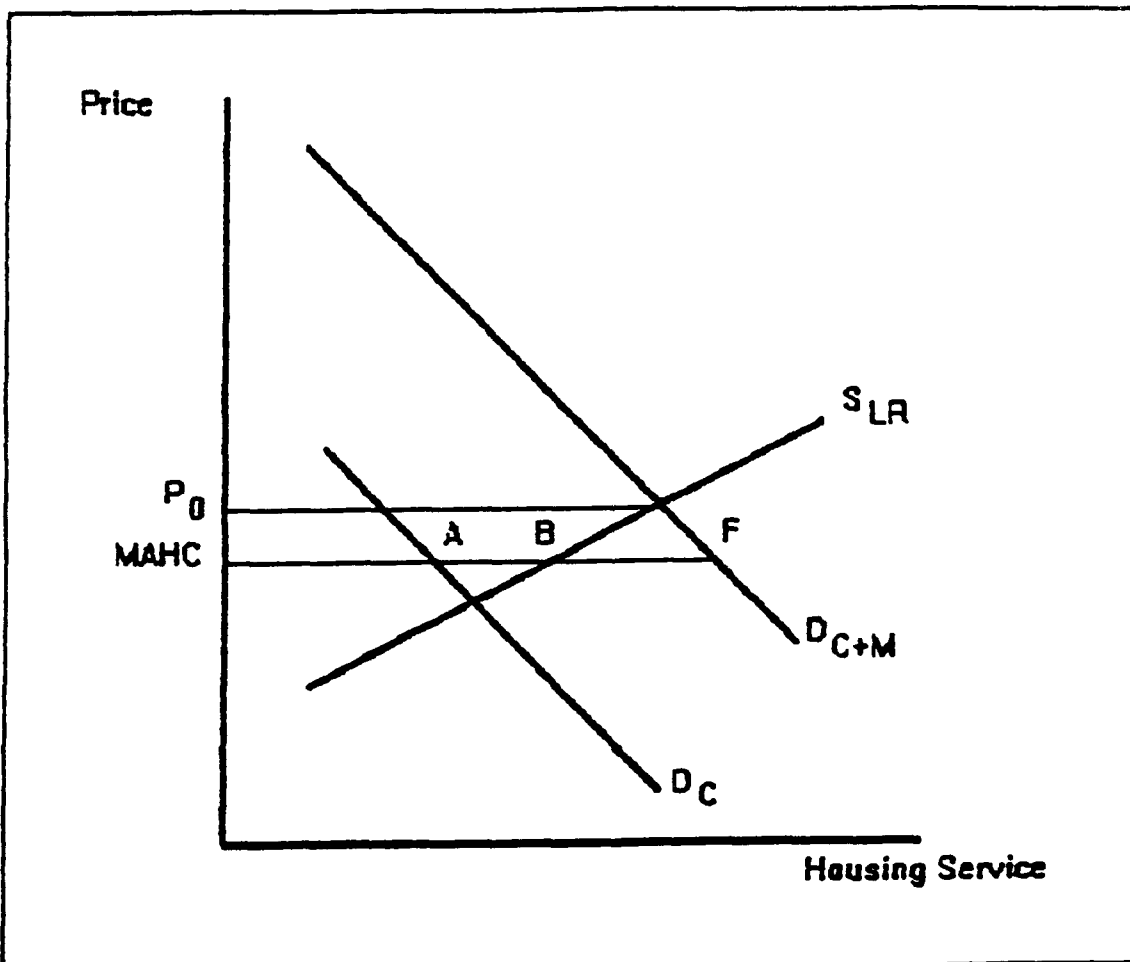


Figure 6 Long-Run Housing Market Analysis

The long-run supply curve for housing can be investigated in both rural and urban areas. In rural areas land is not scarce, and the price of land does not increase

substantially as the quantity of housing supplied increases. Further, the other costs associated with construction would also not increase because there is a national market for materials. Therefore, the long-run elasticity of the supply of housing is likely to be very large [Ref 19:p. 277]. Recent studies have found the long-run supply curve to be nearly horizontal. The same holds true in urban areas even though the land costs rise as the demand for housing services increases. The long-run elasticity of supply will still be large because land costs make up only about one quarter of total housing costs [Ref 19:p. 277].

This conventional supply and demand model can be used to identify the actual housing deficit for any geographical location. In Figure 6, the Maximum Allowable Housing Cost, MAHC, is set below the equilibrium price of private sector housing when no on-base housing exists, P_0 . In this illustration, segment AB is the number of military families the private sector can house without driving the equilibrium price above the MAHC. Segment BF would thus represent the housing deficit at the MAHC that would cause the price to rise to P_0 .

Basic supply and demand analysis is an improvement over the current Department of Defense procedure for determining the housing deficit. The proposed model would tend to consider both military demand as well as possible decreases in the number of existing units that are occupied by

civilian households as a result of the pressure of military demand [Ref 4:p. 58]. This type of analysis provides a more traditional justification for constructing new housing where a deficit can be shown and where on-base housing is more cost effective. Further, current deficits might be eliminated where a large, well established private sector community exists that is capable of increasing supply to meet shifts in demand.

The Department of Defense would still need the flexibility to respond to any special circumstances in all geographical regions. Some well established housing markets may lack the resources or may be unwilling to increase supply to respond to shifts in demand. This unwillingness would tend to affect the junior enlisted personnel more than any other groups as they have the greatest need. Thus, the Department of Defense should use this type of analysis in conjunction with a review of any special circumstances to determine the true housing deficit.

3. Eliminate the Scoring of Public/Private Ventures

The main disadvantage of the public/private ventures is the scoring issue, discussed earlier in Chapter IV, which has rendered these programs completely ineffective over the past five years. The Office of Management and Budget requires that all lease purchases be scored requiring Congressional authorization and appropriation for the total cost of the

proposed lease liability in the first year, even though payments would be made throughout the life of the lease. Thus, the Naval Facilities Engineering Command will not pursue the public/private ventures until the problems are resolved, thereby restricting their available options. The Office of Management and Budget requires public/private ventures to be scored to ensure there is no circumvention of the Gramm-Rudman-Hollings Act, which prohibits the government from entering into a contract that obligates itself beyond the current fiscal year without authorization from Congress.

Scoring is a political issue which needs to be addressed in the political arena with an emphasis on economic justification. Significant savings could result if the requirement were relaxed by the Office of Management and Budget since at least a five percent savings must be proven before a public/private venture can be undertaken in place of a MILCON project. Therefore it is in the best interest of the Department of Defense for the public/private ventures to become a viable option once again.

B. CONCLUSIONS

Four conclusions result from this research. First, the Department of Defense does have an economic justification for providing on-base housing. Second, with this justification in mind, the emphasis should be to "right size", not necessarily to downsize. Third, if assets are to be retired, then those

units on the revitalization backlog should be considered before newly remodeled units when possible. Finally, the VHA/BAQ determination procedures should be revised to equalize the welfare of the service members and their families between high cost and low cost regions.

The bottom line is that the total quality of life of the military families should be considered first and foremost as decisions are made concerning on-base housing. The total welfare of the families, especially the junior enlisted families with the greatest need, must be the emphasis of any analysis. Such a study must look beyond the quantitative data and include the qualitative aspects.

1. The DOD Should Provide On-Base Housing

The Department of Defense has an economic justification for providing on-base housing for military members. The empirical cost-benefit analysis (completed along the lines described previously) is the key factor which must be investigated to consider the benefits to the military families as opposed to the costs to the Department of Defense. On-base housing is necessary to relieve the burden in areas where the local community cannot or will not increase the supply of housing to respond to the shift in demand due to the addition of military families. Further, on-base housing enhances the total quality of life of military families which

occupy it and produces intangible benefits to the Department of Defense (readiness, morale, esprit de corps and so forth).

2. Focus on "Right-Sizing" Housing Assets

The focus of all the analysis should be to "right size" the inventory of on-base housing. There should not be any arbitrary quotas or ceilings set to downsize housing assets as the Forces are downsized. If a true housing deficit can be proven by traditional supply and demand analysis, then options should be pursued to alleviate the shortage. The method used to determine the housing shortage should be revised to reflect a more traditional approach. Further, the public/private ventures should be one of the options available to reduce the deficit if the Department of Defense is to get the most housing service for the money.

3. Investigate the Revitalization Backlog

If assets are to be retired to reduce the size of the housing inventory, then those on the revitalization backlog should be looked at as the first to go. NAVFAC currently maintains a large backlog which includes assets from virtually all geographical regions. It is common sense to retire these assets first to save the revitalization costs as well as future operations and maintenance costs. A simple cost-benefit analysis at each region requiring a reduction of assets could confirm this.

4. Revise VHA and BAQ Determination Procedures

The VHA/BAQ determination procedures are in need of revision or total overhaul. Currently, military families residing in high cost regions tend to get less house for a greater total outlay. This unfairness could be reduced substantially if the procedures used to determine the VHA and BAQ rates were changed. The recommendations section covered this in greater detail.

C. FUTURE RESEARCH

Two topics could be pursued in greater detail. First, a rental market system could be investigated for military family housing to force competition with the private sector. Second, more analysis could be performed on the real value of military family housing. The initial price of on-base housing may be lower than off-base housing because the land has a low opportunity cost. Further, it is accepted that more money may be spent to operate and maintain military housing, but this may correspond to an increased value of the housing assets as well as an extended life. By spending more on housing maintenance the slope of the depreciation curve may be decreased and the useful life may be increased. Thus, while similar sized housing units in the private sector may deteriorate and eventually house lower income families, military family housing units retain families of the same income group. Thus, military family housing units maintained

at a higher standard may cost less over the long run. It is hypothesized that the military unit should be depreciated starting from the price of the off-base unit, as this represents the fair market value.

APPENDIX

The two pages to follow (70 and 71) are an excerpt from a Congressional Budget Office report on military family housing in the continental United States [Ref 4]. The numbers presented are not exact, but merely useful averages from which preliminary decisions and analysis can be drawn. The data suffers from three main weaknesses resulting from differences in characteristics, differences in how costs are measured, and differences in which costs are covered.

First, the Department of Defense and private sector housing have different characteristics which make it difficult to make comparisons between the two. As stated earlier, housing service is a bundle of goods which represent various levels of worth to each military family. Thus, it is hard to categorize a civilian and an on-base house as equivalent for study purposes. We might hypothesize, however, that more housing services are provided in on-base housing than off-base housing for comparably sized dwellings. This hypothesis is consistent with the high operations and maintenance expenditures reported by the Congressional Budget Office, and presented in Figure 6 of this appendix (page 71).

Further, housing services may be increased for the on-base dwelling due to the school impact aid. One may hypothesize that this subsidy increases the quality of the schools where dependents housed on-base attend. The amount the school receives for dependents housed on-base is much greater than the amount they

would receive from taxes if the family were housed in the private sector. Thus, the military family residing on-base may be provided more housing services due to the benefit received from their dependents attending a school of higher quality.

Secondly, the Department of Defense measures costs differently than units in the private sector. As an example, costs per square foot can differ because the convention that the Department of Defense uses to measure square footage is not the same as that used by most private builders [Ref 4:p. 17]. Thus, all comparisons must be viewed with skepticism as judged on their own merits.

Finally, differences in the way costs are covered will affect comparisons. Support services (streets, utilities, fire, police, access to schools, access to recreational facilities...) are incorporated differently into the costs of construction by the Department of Defense and private sector housing developers. It becomes relevant whether costs appear as initial construction costs, or whether they are paid for gradually over the life of the housing unit.

With the previous discussion in mind, it is apparent that it is difficult to accurately compare the costs of on-base and private sector units. As stated, it is difficult to determine units on and off-base which have equal amounts of housing service. There are also difficulties with the sample selection. Personnel living on-base may not necessarily spend the same as personnel living off-base. Further, personnel living off-base may not be doing so willingly, as they may be waiting for on-base housing. Other

families may attach greater housing services to units off-base and thus may choose to reside off-base. There are thus problems associated with the weighting, as well as problems resulting from the military families' choices.

To further complicate the comparisons, it is unclear what the impact would be on the private sector housing costs if the on-base housing were removed. As an example, consider the impact on taxes due to the loss of school impact aid. The schools may need to generate more revenue to replace the loss, thus taxes may go up. This would increase the out-of-pocket expenses and decrease the gap between on-base and off-base housing costs.

The data contained in this appendix thus represent averages based on various Congressional Budget Office assumptions. Again, the numbers are not hard, fast figures, but rough figures to be used for preliminary decisions and analysis.

Box 1.

Decisions About DoD Housing Inventories: How Much Money Will They Save?

Comparing annual costs over the long run (as in Figure 6 on page 74) is useful for making judgments about the relative costs of Department of Defense (DoD) and private-sector housing. But to determine the total costs associated with decisions about DoD inventories, it is useful to focus on the value to today's taxpayers of the entire future "stream" of costs or savings that stem from those decisions.

The Congressional Budget Office (CBO) has estimated the value of the future stream of savings from different decisions about replacing or revitalizing a single DoD family housing unit. (These estimates do not include the possible savings from a reduced requirement for federal land.) In each case, CBO calculated a "present discounted" value for those savings by discounting future savings at a 3 percent annual rate. That approach takes into account the fact that such savings are worth less than current savings to today's taxpayers.

CBO estimated that the present discounted value of federal savings from retiring rather than replacing a DoD unit would amount to \$140,000 over the expected service life of a typical replacement unit. (That estimate assumes an expected life of 57 years for the replacement unit; see Appendix C for details.) The estimate takes into account what the government saves by not constructing, operating, and maintaining the unit throughout its service life as well as the costs incurred in providing housing allowances to an additional family. If DoD retires rather than replaces a unit as part of a permanent inventory reduction, the discounted present value of federal savings is \$170,000. That estimate includes both the \$140,000 saved by forgoing the initial replacement project as well as the discounted savings from forgoing subsequent projects.

Deciding to retire rather than replace a DoD unit has economic impacts beyond those that appear in the federal budget. When DoD reduces its inventories, total resource savings are less than federal savings because more families must pay out-of-pocket costs to obtain housing in the private sector. CBO estimated that the present discounted value of resource savings (that is, federal savings less the additional out-of-pocket costs of military personnel)

would amount to \$90,000 over the expected service life of the replacement unit. If the inventory reduction was permanent (so that there were discounted savings from forgoing subsequent replacement and revitalization projects), those resource savings would equal \$110,000.

Savings from a decision to retire rather than revitalize a unit can also be substantial. CBO estimated that the present discounted value of federal savings from such a decision would amount to \$70,000 over the additional service life of the revitalized unit. (That estimate assumes that revitalization adds approximately 22 years to the service life of a unit; see Appendix C for details.) If deciding not to revitalize a unit resulted in a permanent reduction in DoD inventories (so that the costs of future replacement and revitalization projects were avoided), the federal government would save \$150,000 in discounted terms. CBO estimates that resource savings (federal savings less the out-of-pocket costs of military personnel) would equal approximately \$40,000 during the service life of the revitalized unit. The resource savings from deciding to reduce DoD's inventory permanently by retiring rather than revitalizing a unit would be approximately \$100,000.

Each of these estimates is based on the same data for DoD and the private sector that were used for the annual cost estimates shown earlier (see Figure 6 on page 74). In many respects, they are simply a different way of presenting the same information. For example, Figure 6 indicates that in annual terms, DoD units cost \$3,330 more than private-sector units (excluding the cost of using federal land). If a 3 percent annual discount rate was applied, a permanent savings stream of \$3,300 a year would have a value today of \$110,000. That figure is the estimated savings in resources from a policy decision to reduce the DoD inventory permanently by retiring rather than replacing a single unit. Because the estimates of present discounted savings presented here are based on the same data as the estimates in Figure 6, the limitations and uncertainties that apply to that earlier cost comparison also apply to these estimates.

Figure 6.

Average Annual Long-Run Costs of DoD Housing Compared with Private-Sector Housing Obtained by Military Families (In 1993 dollars)

DoD Unit		Private-Sector Unit	
Operations and Maintenance	\$6,200	Housing Allowances	\$7,500
Amortized Cost of Capital	4,400 ^a	Out-of-Pocket Cost	<u>1,700</u>
School Impact Aid	1,900 ^b	Total	\$9,200 ^d
Cost of Land	<u>500^c</u>		
Total excluding the cost of land	\$12,500		
Total including the cost of land	\$13,000		

SOURCE: Congressional Budget Office based on data from the Departments of Defense and Education.

NOTE: The figure compares the average cost of a Department of Defense (DoD) unit in the United States with what families now living in those units would choose to spend to obtain housing in the private sector. It assumes that such families would spend, on average, the same amount to obtain private-sector housing as similar military families (that is, families in the same paygrade and location) who do live in private-sector housing. It is not necessarily a comparison between units of equal value in the eyes of military families.

- Construction costs were amortized over the service life of the unit using an interest rate of 3 percent. This estimate assumes that initial construction costs are \$100,000, that units are revitalized at a cost of \$60,000 after 35 years, and that units are retired 22 years after being revitalized.
- The average Impact Aid paid by the Department of Education on behalf of the children of families living in DoD units less the average cost of the payment that would be made if those families lived in housing in the private sector.
- The cost of holding land. It assumes that land for a DoD unit is worth \$15,000, on average, and that the annual cost to the federal government of holding an asset is equal to 3 percent of its value.
- This total implicitly includes all of the costs applicable to housing in the private sector, including real estate taxes, the cost of maintenance and utilities, the cost of holding land, depreciation, and interest.

LIST OF REFERENCES

1. Ray, T., The Operation of Military Family Housing as a Business Enterprise, Master's Thesis, Air Force Institute of Technology, Dayton, Ohio, September, 1991.
2. Barrera, J., An Analysis of Public/Private ventures for the Construction of Military Family Housing, Master's Thesis, Naval Postgraduate School, Monterey, California, December, 1990.
3. Camm, F., Housing Demand and Department of Defense Policy on Housing Allowances, Rand National Defense Research Institute, Santa Monica, California, September, 1990.
4. Congressional Budget Office Study, Military Family Housing in the United States, Washington, District of Columbia, September, 1993.
5. Gertcher, F., Military Family Housing Compared to Private Housing: a Benefit Cost Model, Final Report, United States Air Force Academy, Colorado Springs, Colorado, November, 1982.
6. Van Oss, H., An Economic Analysis of the Alternatives for Providing Military Family Housing at NPS Monterey, California, Master's Thesis, Naval Postgraduate School, December, 1990.
7. Report of the President's Economic Adjustment Committee, Affordable Housing for Military Families, Washington, District of Columbia, April, 1989.
8. Metcalf, D. and Hoyler, M., Availability of Acceptable Off-Base Housing, Logistics Management Institute, March, 1987.
9. Gertcher, F., "Military Family Housing Compared to Private Housing," Review of Social Economy, v. XLI, No. 2, October, 1983.
10. General Accounting Office, Section 801, 802 Program Review and Status Report, October, 1986.
11. Brown, D., Increasing the Supply of Family Housing, Logistics Management Institute, September, 1988.
12. Telephone conversation between John Perrygo, Naval Facilities Engineering Command, Alexandria, Virginia and the author, February 3, 1994.

13. Telephone conversation between Don Wonderly, Naval Facilities Engineering Command, Alexandria, Virginia and the author, February 4, 1994.
14. National Association of Home Builders Research Center, Military Family Housing Cost Study: Executive Summary Report, Upper Marlboro, Maryland, October, 1987.
15. Telephone conversation between Monica Omans, Naval Facilities Engineering Command, Alexandria, Virginia and the author, March 11, 1994.
16. Joint Federal Travel Regulations, U8002, U8003.
17. Telephone conversation between Steve Keating, Naval Facilities Engineering Command, Alexandria, Virginia and the author, March 23, 1994.
18. Nicholson, W., Microeconomic Theory, The Dryden Press, Fort Worth, Texas, 1992.
19. Pindyck, R. and Rubinfeld, D., Microeconomics, Macmillan Publishing Company, New York, New York, 1992.
20. Hirshleifer, J., Price Theory and Applications, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1988.
21. Parkin, M., Microeconomics, Addison-Wesley Publishing Company, Reading, Massachusetts, 1989.
22. Office of the Secretary of Defense, Defense Management Report Decision Number 966, Washington, District of Columbia, November, 1990.
23. Office of the Secretary of Defense, Defense Management Report Decision Number 910, Washington, District of Columbia, November, 1990.
24. McCarty, J., "Navy Civil Engineer," Have you Considered the MILCON Direct Purchase Alternative?, Alexandria, Virginia, Fall 1993.
25. Telephone conversation between LCDR Paul Bosco, Public Works Officer, Naval Postgraduate School, Monterey, California and the author, April 22, 1994.
26. The Office of Management and Budget Circular A-94.

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